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PMC56 MODULE

USER'S MANUAL

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CHAPTER 1
GENERAL INFORMATION

1.1 OVERVIEW

The PMC56 module expands the I/O capabilities of its host board by providing one 16-bit Ultra2 SCSI port. The PMC56 connects to the PMC Module Interface on its host board. The module may be hosted on the Cyclone CPCI-94x series of CompactPCI cards.

See any of the CPCI-94x manuals for more information on the PMC Module Interface.

1.2 FEATURES

- One 16-bit Ultra2 SCSI (80MB/s) SCSI port based on the Symbios Logic SYM53C895 PCI-Ultra2 SCSI I/O Processor with LVDlink Universal Transceivers.
- Very High Density Cable Interconnect (VHDCI) connector.

1.3 SPECIFICATIONS

Table 1-1. PMC56 Power Requirements

Voltage	Current Typical	Current Maximum
+3.3V	0.51 A	0.93 A
+5V	0.80 A	1.12 A
+12V	0 A	0 A
-12V	0 A	0 A

Host Clock signal: 33MHz Maximum

Physical Characteristics: Height x Width: 2.913" x 5.886"
Occupies one PMC Module Location

1.4 ASSEMBLY DRAWING

The layout or assembly drawing is shown in Figure 1-1.

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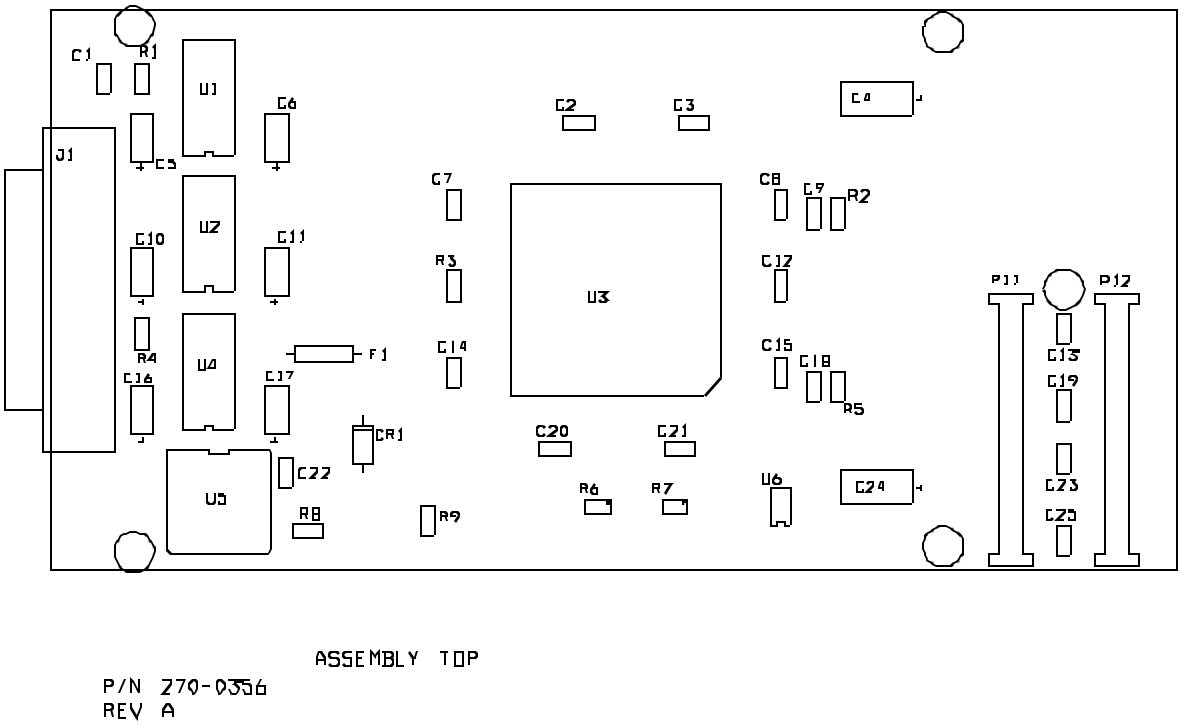


Figure 1-1. Assembly Drawing

1.5 PANEL DRAWING

The layout of the front panel of the PMC module is shown in Figure 1-2.

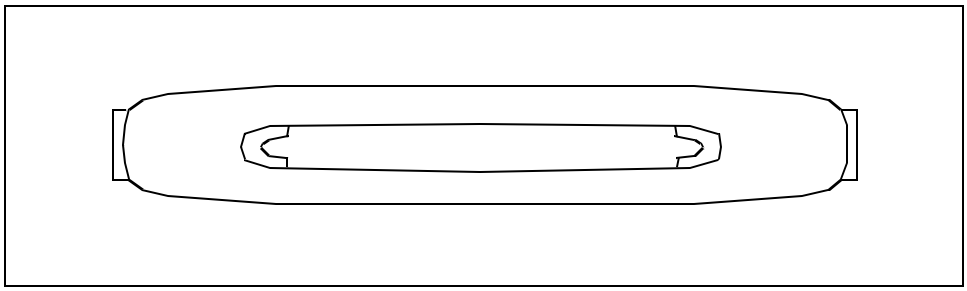


Figure 1-2. PMC Panel Drawing

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1.6 REFERENCE MANUALS

SYM53C895 Data
Symbios Logic
Microelectronic Products Division
1731 Technology Drive, Suite 610
San Jose, CA 95110
(800) 334-5454

CompactPCI Specification, Rev. 1.0
PCI Industrial Computer Manufacturers Group
301 Edgewater Place
Dallas, TX 75265
(617) 224-1100
(617) 224-1239 (Fax)

PCI Local Bus Specification, Rev 2.1
PCI Special Interest Group
PO Box 14070
Portland, OR 97214
(800) 433-5177 (US)
(503) 797-4207 (International)
(503) 234-6762 (Fax)

IEEE STD P1386, Draft 2.0
IEEE Std P1386.1, Draft 1.5
Institute of Electrical and Electronics Engineers
PO Box 1331
445 Hoes Lane
Piscataway, NJ 08855-1331

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CHAPTER 2
INSTALLATION

2.1 INSTALLATION ON A HOST

Static discharge can severely damage integrated circuits. The host board and PMC Modules should only be handled with proper static protection. PMC Modules should always be installed with power to the host board OFF. Mounting or dismounting a module with the host power on could permanently damage the circuitry on the module.

Refer to the PMC56's host board user's manual for PMC module mounting locations.

The PMC56 has one 68 position VHDCI type connector on its front panel. Remove the corresponding blank panel from the host board. It is easier to remove the blank panel by forcing it out from behind. The PMC56 module is mounted to the CPCI host board via stand-offs. Stand-offs and screws are provided to secure the module to the host.

PMC Modules mount "face down", that is, with the component side of the module facing the component side of the host. While holding the module upside down, carefully tip the front panel connector of the module through the opening in the host panel and rotate the opposite edge of the module down, aligning the module and host connectors. With the module and host aligned, press the two assemblies together, fully mating the connectors. Install the mounting hardware, two screws for the stand-offs and two screws for the module front panel, and secure the PMC to the host.

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CHAPTER 3
HARWARE DESCRIPTION

3.1 INTRODUCTION

This chapter describes the hardware and general operation of the PMC56 Module. The VLSI circuits are not described in detail. The user should consult the manuals and data sheets listed in section 1.6 REFERENCE MANUALS, for a detailed description of these devices. Connectors are not covered in detail in this chapter, see Chapter 5, CONNECTORS, for more information. Consult Chapter 4 for software and programming information. The PMC56 Module has one PCI device; Symbios Logics SYM53C895 PCI-Ultra2 SCSI I/O Processor with LVDlink Universal Transceivers.

A block diagram is shown in Figure 3-1. The figure shows the major components, the PMC connectors and the Ultra2 SCSI port.

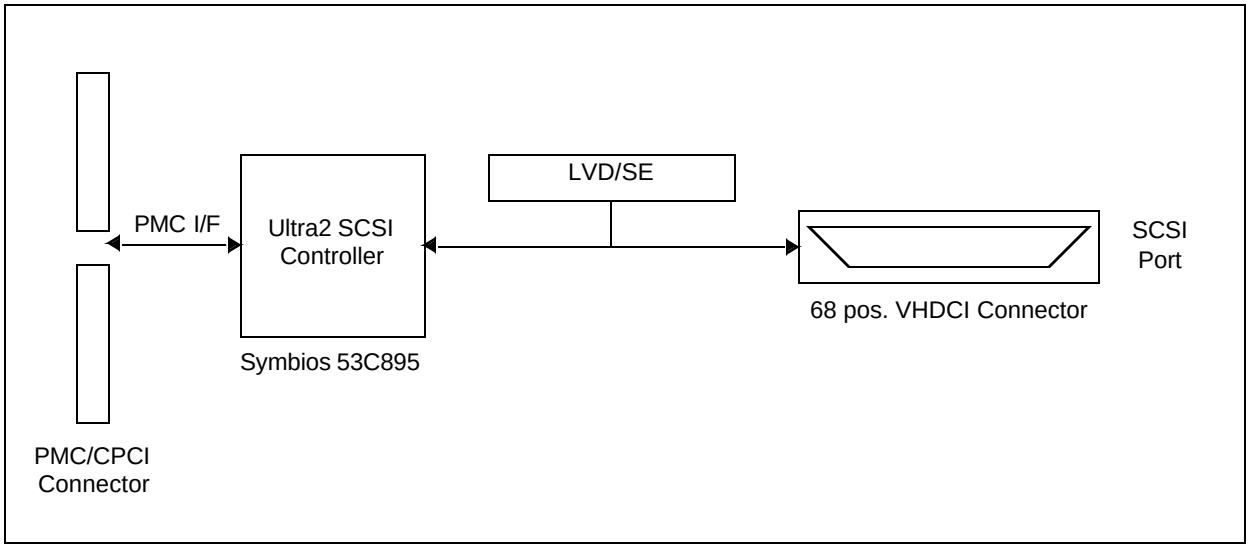


Figure 3-1. PMC56 Block Diagram

3.2 SCSI PORT

The SCSI port is an LVD (low voltage differential) 16-bit Ultra2 SCSI (80MB/s) SCSI port based on the Symbios Logic SYM53C895 PCI-Ultra2 SCSI I/O. The 53C895 is the core component of the SCSI interface. It uses a PCI interface to communicate with the host and connects directly to the SCSI bus. The 53C895 has built in universal transceivers that can determine the SCSI bus signaling environment (i.e. LVD or single-ended) and automatically switches to the correct signaling.

3.3 53C895 SCSI CONTROLLER

The 53C895 is an intelligent SCSI host adapter which includes a high performance SCSI core, a 32-bit PCI bus master DMA core and an integrated SCSI SCRIPTS processor.

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The SCSI core supports the 8- or 16-bit data bus. It supports Ultra2 SCSI synchronous transfer rates up to 80MB/s, UltraSCSI synchronous transfer rates up to 40MB/s, SCSI-2 synchronous transfer rates up to 20MB/s and asynchronous transfer rates up to 10MB/s on a 16-bit SCSI bus.

The 32-bit PCI bus master DMA core is tightly coupled to the SCSI core through the SCRIPTS processor, which supports uninterrupted scatter/gather memory operations. A 816 byte FIFO allows the 53C895 to support up to 128 longword bursts across the PCI interface.

The SCRIPTS processor executes complex SCSI bus sequences independently of the host CPU. Algorithms written in SCSI SCRIPTS control the actions of the SCSI and DMA cores and are executed from the host board's RAM.

3.4 SCSI PORT CONNECTOR

The SCSI port connects to a 68 position Very High Density Cable Interconnect (VHDCI) connector on the edge of the PMC56 PCB. This connector conforms to the "alternative-4 shielded SCSI device connector" of the SCSI Parallel Interface-2 (SPI-2) draft standard. The pinout of this connector conforms to the "connector contact assignments for a 68 conductor primary bus that uses LVD transceivers" of the SPI-2 draft standard. The SCSI port connector pinouts can be found in Chapter 5.

3.5 SCSI PORT TERMINATION

The SCSI specification calls for all signals not defined as RESERVED, GROUND or TERMPWR to be terminated at each end of the cable. Additionally, the SPI-2 draft specification defines a multimode (LVD/SE) signaling scheme that provides backwards compatibility to single ended SCSI devices and systems. Multimode operation requires transceivers and terminators to sense the SCSI bus type (LVD or SE) and then switch to that mode of operation. The PMC56 implements multimode operation by using multimode terminators and the multimode transceivers of the 53C895.

The PMC56 is intended for use at the end of the SCSI cable. If the PMC56 SCSI port cannot be placed at either end of the SCSI cable, then the multimode termination must be turned off. To do this, the surface mount resistor at position R9 must be desoldered and removed from the PMC56 printed circuit board.

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CHAPTER 4
PROGRAMMING INFORMATION

4.1 INTRODUCTION

This chapter provides software and programming information for the PMC56 Module. This chapter does not contain a list of registers in the devices. The user should consult the manuals and data sheets listed in section 1.6, REFERENCE MANUALS, for a detailed description of registers and configuration information. Consult Chapter 3 for hardware and general operation of the PMC56 Module.

Included with each PMC56 is a companion diskette (Cyclone part number 700-0230) containing example source code in the form of a downloadable diagnostic routine for the 53C895. The companion diskette also includes the diagnostic header file and both compiled and uncompiled versions of the initiator SCSI script.

The PMC56 Module connects to the PMC Module Interface of its host CPCI board. The PMC Module Interface is a 32-bit PCI bus conforming to the PCI Local Bus Specification Revision 2.1, with exceptions noted in the host board users manual and Chapter 3.

4.2 SCSI PORT

This section defines specific setup requirements for the SYM53C895 processor to insure proper operation of the PMC56. In order to use the Ultra2 SCSI capabilities of the SYM53C895, it is necessary to enable the clock quadrupler. This involves properly configuring registers STEST1 (register 4Dh), STEST3 (register 4Fh), and SCNTL3 (register 03h) of the SYM53C895. The SYM53C895 uses the internal clock quadrupler and a 40 MHz external clock to achieve a 160 MHz SCLK frequency. See the SYM53C895 Data Manual for further information.

The default operating mode for the SCSI port is 8-bit, 10 MB/s transfer rate. The SYM53C895 supports both wide-SCSI (16-bit) and Ultra2 SCSI, resulting in a maximum potential transfer rate of 80 MB/s (16-bit). Operation in wide and/or Ultra or Ultra2 SCSI modes requires negotiation with the initiator or target. See the SCSI specification or the SPI-2 draft for the SCSI message system definition.

For Ultra2 operation, the Synchronous Clock Conversion Factor bits SCF2, SCF1 and SCF0 (bits 6, 5, 4) of the SCSI Control Three register (SCNTL3, register 03h) should be set to 0, 0, 1 to divide the SCLK frequency of 160MHz by 1 (which is divided internally again by 4 for a 40 MHz clock internal to the SYM53C895). Set the Asynchronous Clock Conversion bits CCF2, CCF1 and CCF0 (bits 2, 1, 0) to 1, 1, 1. Enable Ultra or Ultra2 transfer rates by setting the ULTRA bit (bit 7) to a 1. Enable 16-bit transfers by setting the EWS bit (bit 3) to a 1. See the SYM53C895 Data Manual for further information.

Host bus parity checking should not be used. The MPEE bit (bit 3) of the Chip Test Four (CTEST3, register 21h) should be left at its default value of 0.

The SCSI Differential Mode bit DIF (bit 5) of the SCSI Test Register 2 (STEST2, register 4Eh) should be left at its default value of zero for single-ended or LVD operation.

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CHAPTER 5
CONNECTORS

5.1 PMC MODULE CONNECTOR

PMC56 Module uses two EIA E700 AAAB board-to-board connectors with 64 pins each. Standoffs are used to maintain the spacing between the PMC56 and the host, and to provide mechanical stability.

The 4 BUSMODE pins are not utilized on the PMC56. Cyclone's CPCI-94x host boards do not drive BUSMODE [4:2]# signals nor does the PMC56 drive the BUSMODE1# signal.

Table 5-1. P11 PMC Module Connector Pinout

Pin	Signal	Pin	Signal
1	TCK	2	-12V
3	GND	4	INTA#
5	INTB#	6	INTC#
7	BUSMODE1#	8	+5V
9	INTD#	10	PCI-RSVD
11	GND	12	PCI-RSVD
13	CLK	14	GND
15	GND	16	GNT#
17	REQ#	18	+5V
19	V(I/O)	20	AD31
21	AD28	22	AD27
23	AD25	24	GND
25	GND	26	C/BE3#
27	AD22	28	AD21
29	AD19	30	+5V
31	V(I/O)	32	AD17
33	FRAME#	34	GND
35	GND	36	IRDY#
37	DEVSEL#	38	+5V
39	GND	40	LOCK#
41	SDONE#	42	SBO#
43	PAR	44	GND
45	V(I/O)	46	AD15
47	AD12	48	AD11
49	AD09	50	+5V
51	GND	52	C/BE0#
53	AD06	54	AD05

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55	AD04	56	GND
57	V(I/O)	58	AD03
59	AD02	60	AD01
61	AD00	62	+5V
63	GND	64	REQ64#

Table 5-2. P12 PMC Module Connector Pinout

Pin	Signal	Pin	Signal
1	+12V	2	TRST#
3	TMS	4	TDO
5	TDI	6	GND
7	GND	8	PCI-RSVD
9	PCI-RSVD	10	PCI-RSVD
11	BUSMODE2#	12	+3.3V
13	RST#	14	BUSMODE3#
15	+3.3V	16	BUSMODE4#
17	PCI-RSVD	18	GND
19	AD30	20	AD29
21	GND	22	AD26
23	AD24	24	+3.3V
25	IDSEL	26	AD23
27	+3.3V	28	AD20
29	AD18	30	GND
31	AD16	32	C/BE2#
33	GND	34	PMC-RSVD
35	TRDY#	36	+3.3V
37	GND	38	STOP#
39	PERR#	40	GND
41	+3.3V	42	SERR#
43	C/BE1#	44	GND
45	AD14	46	AD13
47	GND	48	AD10
49	AD08	50	+3.3V
51	AD07	52	PMC-RSVD
53	+3.3V	54	PMC-RSVD

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55	PMC-RSVD	56	GND
57	PMC-RSVD	58	PMC-RSVD
59	GND	60	PMC-RSVD
61	ACK64#	62	+3.3V
63	GND	64	PMC-RSVD

5.2 SCSI PORT CONNECTOR

The SCSI port connects to a 68 position Very High Density Cable Interconnect (VHDCI) connector on the edge of the PMC56 PCB. This connector conforms to the "alternative-4 shielded SCSI device connector" of the SCSI Parallel Interface-2 (SPI-2) draft standard. The pinout of this connector conforms to the "connector contact assignments for a 68 conductor primary bus that uses LVD transceivers" of the SPI-2 draft standard. The SCSI port connector pinout is shown in Table 5-3.

Table 5-3. SCSI Port Connector

Pin	Signal	Pin	Signal
1	+DB12	35	-DB12
2	+DB13	36	-DB13
3	+DB14	37	-DB14
4	+DB15	38	-DB15
5	+DBP1	39	-DBP1
6	+DB0	40	-DB0
7	+DB1	41	-DB1
8	+DB2	42	-DB2
9	+DB3	43	-DB3
10	+DB4	44	-DB4
11	+DB5	45	-DB5
12	+DB6	46	-DB6
13	+DB7	47	-DB7
14	+DBP0	48	-DBP0
15	Ground	49	Ground
16	DIFFSENS	50	Ground
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	N/C	53	N/C
20	Ground	54	Ground

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Pin	Signal	Pin	Signal
21	+ATN	55	-ATN
22	Ground	56	Ground
23	+BSY	57	-BSY
24	+ACK	58	-ACK
25	+RST	59	-RST
26	+MSG	60	-MSG
27	+SEL	61	-SEL
28	+C/D	62	-C/D
29	+REQ	63	-REQ
30	+I/O	64	-I/O
31	+DB8	65	-DB8
32	+DB9	66	-DB9
33	+DB10	67	-DB10
34	+DB11	68	-DB11

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